engineering adventures

Worksheet HP1 & Training Record Hydraulic Pump and Motor Basics		Hydraulic Pumps
Email:	Course:	Provider:

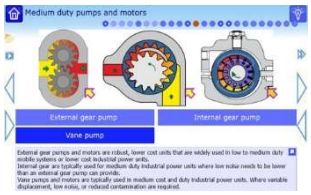
Expected Outcomes: (90-120mins)

Understand the main types of hydraulic pump including what they do, where they are used, and how they function.
Experiment with variable and fixed displacement pump and valve combinations and record a PQ curve.

Previous Knowledge Required:

Students should have completed worksheet FB1 'Formulas and fundamentals' or have a good knowledge of what hydraulic components are used for.

Self-driven, micro-learning tutor (SDLT)



Complete the 'pump basics training' SDLT via the website, phone app or CD/download.
On completion, email the results to yourself or to your course provider.
We recommend you also record the time below and notes of all observations and exercise findings.

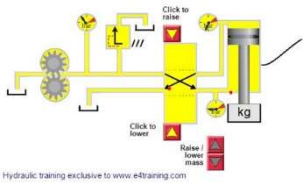
Total score & time:

Detailed explanations and instructional videos

Visit the 'hydraulic pump review' section on the website, phone app or CD/download. Read the additional explanations and watch the instructional videos.
Keep a record of the time you spend studying in each section.

Dates & durations

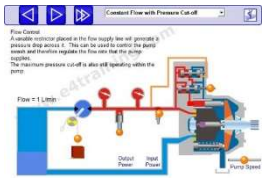
Interactive experiments



Experiment with the 'basic circuit component' simulation :

- Observe how the pump creates flow.
- Operate the valve to see how the flow extends and retracts the cylinder.
- Change the load on the cylinder. Operate the valve and observe how the pressures change with different cylinder loads.
- Observe what happens to the flow and pressure at the end of the cylinder stroke.

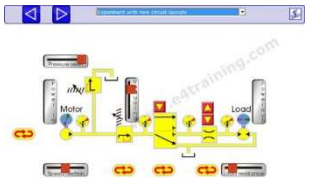
Date, score & time:



Experiment with the 'piston pump control' simulation :

- Observe how the pistons move to create the flow.
- Change the load on the motor and observe how the system pressure changes.
- Operate the throttle valve to restrict the flow and observe how the pump swash angle changes and pump flow reduces.
- Record your observations in you're a course notebook.

Date, score & time:



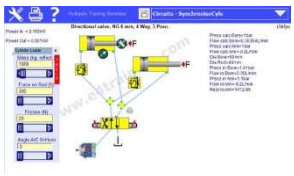
Experiment with the 'hydraulic motor control' simulation :

- Operate the directional valve to start and stop the hydraulic motor.
- Adjust the electric motor speed and observe how the hydraulic motor speed changes.
- Adjust the motor load resistance and observe how the system pressure and speed do or don't vary.
- Record your observations in course notebook.

Date, score & time:

Total score & time:

Circuit builder experiments



Open the 'hydraulic circuit simulation' software :

A) Select circuit: Pumps - Fixed Pump Experiment 1

- Operate the cylinder and observe the pressure when the cylinder is stationary, moving and at its end stops.
- Click the cylinder rod to change the loads on the cylinder. Repeat the above observations.
- Discuss the potential of overheating with different operating cycles

B) Select circuit: Pumps - Diagnose 1 Fixed Pump

- Operate the cylinder and observe the pressure when the cylinder is stationary and moving.
- Explain what could be improved with this circuit to save energy.

C) Select circuit: Pumps - Test Pump Performance

- In this test the orifice represents pump leakage or inefficiencies.
- Adjust the relief valve setting and press the printer icon to record the Flow vs Pressure or PQ curve. Copy to a spreadsheet then print graph.

App date & duration

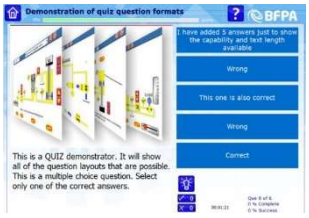
Coursework

Produce a report to explain which pumps might be used for the hydraulic scissor lift and why. These are likely to include:

- Operating conditions, working life, duty and maintenance requirements.

Number of sheets attached	

Interactive quiz



Complete the pumps section of the 'Quiz - Basic Hydraulics'.
Click email button to send results and record below.

Quiz name, date, score	

Qualification requirements:

Students need to complete and return all worksheets and course notes to their registered training provider. Methods of testing and qualification may vary between course providers, however, we recommend that students record as much information about their observations, simulation experiment results, and discussions as possible. To achieve a certificate, students will need to provide written evidence of their findings e.g. when we say observe X, we need to know the results you see and when we say discuss X, we need to know the implications of these findings as well.

In most programs, students can send a record of their actions and results by clicking the email button that will appear in the top menu bar of the app, at mid to end point of the training.